Course Description
EE 4341 – Communication Systems

2002-2004 Catalog Data: Spectral density and correlation; sampling theory, linear, angle and pulse modulation, random signals and noise, effects of noise in modulation system. Prerequisite: EE 3353 and EE 3384, each with grade of “C” or better.

Prerequisite by Topic:
1. Fourier transforms
2. Probability and random variables
3. Linear system theory


Course Outcomes: Students completing EE 4341 will be able to:

1. Understand the principles of operation of linear modulation systems (C).
2. Understand the principles of operation of angle modulation systems (C).
3. Understand the principles of operation of coded modulation systems (C).
4. Determine bandwidth and signal-to-noise ratios of linear, angle and coded modulation systems (C).
5. Select and design a modulation system to satisfy given constraints and requirements (C).

Topics Covered:
1. Signal transmission, spectral analysis and sampling (6hrs).
2. Linear, angle and coded-pulse modulation in a noise-free environment (10hrs).
3. Noise sources and calculations (5hrs).
5. Noise effects on linear, angle and coded-pulse modulation (9hrs).
6. Link budget analysis (3hrs).
7. Optimum modulation systems (2hrs).

Class Schedule: Three hours lecture per week.

Contributions to Professional Component:

EE 4341 is a senior elective course which builds on topics covered primarily in required junior courses. It is one of a
group of courses which may be taken by students specializing in communications and signal processing. It may also be taken as an elective by students seeking additional breadth in their program of study.

Relationship to Program Outcomes:

1. Have an ability to apply knowledge of mathematics science and engineering.

Students use concepts from calculus, linear systems theory and probability theory to analyze and design linear, angle and coded-pulse modulation systems (Course Outcomes 1-4).

3. Have an ability to design a system or component to meet desired needs.

Some homework problems have design elements. There are three group design projects where students design a system with specified requirements (Course Outcome 5).

5. Have an ability to identify, formulate and solve engineering problems.

Students practice these skills while solving homework problems and completing design projects (Course Outcomes 4 and 4).

7. Have an ability to communicate effectively.

Students make oral presentations of homework solutions to the class. They write a brief report involving operations of some modulation scheme not addressed in class or they critique a paper dealing with some aspect of modern communications (Course Outcomes 1-3).

Course Outcomes do not relate to Program Outcomes 2, 4, 6, 8-11. They do correlate with Educational Objective 1 (65%) and Educational Objective 2 (35%).

Computer Usage: Students may use Matlab on some homework assignments. Group projects may require Matlab use.

Prepared by: Michael E. Austin, Professor Emeritus of ECE